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EFFECTS OF VARIATIONS IN GIN AND MILL CLEANING ON THE LINT AND YARN QUALITY OF MECHANICALLY PICKED AND STRIPPED COTTONS

By J. D. Bargeron, III,[1] Warren E. Garner,[2] and Roy V. Baker[3]

ABSTRACT

Several combinations of harvesting, ginning, and mill-cleaning practices were applied to cottons from the Midsouth, Southeast, and West Texas growth areas. The Midsouth and Southeast cottons were harvested before and after frost, and the West Texas cotton was harvested after frost only. Fiber-quality data on finisher-drawing sliver for the Midsouth and Southeast cottons indicated that removal of trash at the card, rather than in an earlier stage of processing, resulted in less fiber damage. No overall conclusions were possible concerning the effect of time of harvest on yarn quality. Some of the yarn-quality characteristics of the Midsouth cotton were better for the harvest before frost, and some were better for the harvest after frost. However, the yarn quality of the Southeast cotton was consistently better for the earlier cotton harvest. Spinning production rates reflected the level of yarn quality. There was little difference in the production rates of the before- and after-frost harvests for the Midsouth cotton, but the production rates for the earlier harvest of the Southeast cotton were higher than those for the later harvest. Generally, high production rates and yarn qualities were achieved with minimum cleaning at both the gin and mill. **KEYWORDS: cotton (mechanically picked), cotton (mechanically stripped), gin and mill cleaning (variations), ginned-lint quality, spinning performance, yarn quality.**

INTRODUCTION

The amount of trash in cotton is of major concern to both cotton producer and yarn manufacturer. A high trash level in ginned lint results in a lower price to the cotton producer. It also means that the yarn manufacturer has to use more beating points to remove the trash, which increases the probability of fiber damage. The size of trash particles is also important, since fine trash particles are more difficult to remove in mill processing than are large trash particles.

Traditionally, the ginner has attempted to remove as much trash as has been economically possible. As the proportion of machine-harvested cotton increased, the number of machines for cleaning seed cotton and ginned lint increased. A typical sequence of machines at the

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ight include a drier, cleaner, stick ma- drier, cleaner, and, after ginning, two eaners.

other factor that can affect the amount of in cotton is whether it is picked before or frost. Cotton picked after frost contains trash as a result of the plant becoming e and thus less able to withstand the anical action of the picker.

s study was designed to determine the ef- of several combinations of gin- and mill- ng conditions on lint and yarn quality. eliminary tests two lots of seed cotton ginned without being subjected to drying aning equipment. One lot was picked be- frost, and the other lot was picked after The resulting lint was considered to have ent uniformity and to have fewer neps int that had been processed through the l cleaners and driers. In addition, the was of large particle size, and such parti- o not present as many removal problems mill as do fine particles.

cottons selected for this study were from ississippi Delta (Midsouth), South Caro- iedmont (Southeast), and Texas South (West Texas) growth areas. In the Mid- and Southeast areas the cottons were mechanically picked from adjacent plots, one before frost and one after frost. The West Texas cotton was mechanically stripped after frost only.

EQUIPMENT AND METHODS

Gin- and Mill-Cleaning Conditions

Two levels of gin cleaning were used for each harvest of the three cottons. These levels comprised a normal amount of cleaning for the type of cotton used and a minimum amount of cleaning. For the Midsouth and Southeast cottons, the normal cleaning sequence consisted of a drier, cleaner, stick machine, drier, cleaner, and two lint cleaners. The minimum cleaning sequence comprised a drier and stick machine. For the West Texas cotton, the normal cleaning sequence consisted of an air-line cleaner, cylinder cleaner, bur machine, cylinder cleaner, stick machine, and two lint cleaners. The minimum cleaning sequence for this cotton consisted of a cylinder cleaner and stick machine. All the West Texas cotton was processed through two driers with unheated ambient air.

Each of the two ginning sequences for each cotton was followed with minimum mill cleaning.

TABLE 1.—*Experimental design for gin- and mill-cleaning study*[1]

Growth area	Time of harvest	Gin-cleaning condition	Milli-cleaning condition	Harvesting and processing code
Midsouth	Before frost	Minimum	Minimum	Bef-min-min
Do	do	Normal	do	Bef-norm-min
Do	do	Minimum	Additional	Bef-min-add
Do	After frost	do	Minimum	Aft-min-min
Do	do	Normal	do	Aft-norm-min
Do	do	Minimum	Additional	Aft-min-add
Southeast	Before frost	do	Minimum	Bef-min-min
Do	do	Normal	do	Bef-norm-min
Do	do	Minimum	Additional	Bef-min-add
Do	After frost	do	Minimum	Aft-min-min
Do	do	Normal	do	Aft-norm-min
Do	do	Minimum	Additional	Aft-min-add
West Texas	After frost	do	Minimum	Aft-min-min
Do	do	Normal	do	Aft-norm-min
Do	do	Minimum	Additional	Aft-min-add

[1] Midsouth and Southeast cottons: Normal gin-cleaning condition—drier, cleaner, stick machine, drier, cleaner, and 2 lint cleaners. Minimum gin-cleaning condition—drier and stick machine. West Texas cotton: Normal gin-cleaning condition—air-line cleaner, cylinder cleaner, bur machine, cylinder cleaner, stick machine, and 2 lint cleaners. Minimum gin-cleaning condition—cylinder cleaner and stick machine. Additional mill-cleaning condition—fiber opener and impact cleaner.

A third cleaning condition, using additional ıill-cleaning equipment, was included after ıinimum gin cleaning of each test cotton. The ddditional mill-cleaning equipment consisted of fiber opener and an impact cleaner, which ere used between the blending feeders and ıperior cleaner comprising the minimum ill-cleaning line.

The experimental design showing the growth ea, time of harvest, gin-cleaning condition, ill-cleaning condition, and harvesting and ocessing code is shown in table 1.

Mill Processing

Processing was similar for each of the mixes, om picking through roving. Each spinning lot as processed into a 14-ounce-per-yard picker p. The laps were then carded at 10 pounds per ur to produce a 55-grain-per-yard sliver on a rd equipped with crush rolls. At breaker and nisher drawings, 8 ends up were fed, and the livery rate was 265 feet per minute. The ver weights produced were 53 grains at eaker drawing and 55 grains at finisher awing. At the roving frame, a 1.0 hank rov- was produced with a 1.30 twist multiplier. e Midsouth and Southeast cottons were spun o 40s yarn with a 3.60 twist multiplier from gle creel, and the West Texas cotton was un into 30s yarn with a 3.75 twist multiplier, o from single creel. The spinning production e for each cleaning condition (two replica- ns), expressed as front-roll revolutions per nute, was arrived at by varying the spindle ed and tensor setting in the initial replica- n to achieve a nominal level of 30 ends down 1,000 spindle-hours. The mean level actually ieved was 35.

Fiber and Yarn Testing and Analysis

Fibrograph length, Pressley strength at 1/8- h gage, and micronaire fineness were meas- d on four subsamples of ginned lint from h bale and on one sample of finisher-draw- sliver from each processing lot.

For each spinning lot, 10 bobbins of yarn m each of 4 spinning frames were tested for in strength and yarn size. Sixteen bobbins e tested for Uster evenness and imperfec- s at a speed of 25 yards per minute for 5 utes. The sensitivity of the imperfection cator was set at 30 percent for thin places and at setting number 4 for thick places and neps. Single-strand strength and elongation tests were made on 40 bobbins, with 10 breaks per bobbin. Yarn appearance was determined from three boards per spinning test by three technicians.

All comparisons on the effects of harvesting time and cleaning conditions were made from the results of Duncan's multiple-range test to determine whether significant differences existed at the 95-percent level of significance.[4] No comparisons were made between cottons from different growth areas, since differences in fiber and yarn quality peculiar to growth area were to be expected.

RESULTS

Gin Cleaning

Midsouth

The seed-cotton and lint-moisture contents were slightly different for the four ginning treatments (table 2). Each treatment had similar foreign-matter content at the wagon. The normal gin treatment yielded less foreign-matter content at the feeder for both harvests. Minimum gin cleaning produced Shirley analyzer waste values that were approximately four times higher than those produced by normal cleaning (table 3). Seed-cotton bale weights were not available for the Midsouth cotton, but bale weights were estimated from lint-cleaning experiments with similar cottons, i.e., a bale weighing 500 pounds with normal cleaning would weigh 546 pounds with minimum cleaning. The normal gin treatment produced cotton that was graded Strict Low Middling Light Spotted, and the minimum gin treatment produced cotton that was graded Low Middling Light Spotted. There were no differences in classer's staple length for the four treatments.

Southeast

There was no significant difference in the moisture contents of the cottons subjected to the four treatments (table 2). The foreign-

[4] Barr, A. J.; Goodnight, J. H.; Sall, J. P.; and Helwing, J. T. 1976. A user's guide to the statistical analysis system, pp. 108–119. Department of Statistics, North Carolina State University, Raleigh.

TABLE 2.—*Effects of gin-cleaning conditions on moisture and foreign-matter contents of test cottons*[1]

Growth area and time of harvest	Gin-cleaning condition[2]	Seed-cotton moisture content (pct)	Lint moisture content (pct)	Seed-cotton foreign-matter content at—	
				Wagon (pct)	Feeder (pct)
Midsouth:					
Before frost	Minimum	11.5a	5.9a	6.9a	2.3ab
Do	Normal	11.6a	5.1a	6.4a	1.8c
After frost	Minimum	9.3a	5.6a	5.7a	2.5a
Do	Normal	8.5a	5.2a	7.2a	2.0bc
Southeast:					
Before frost	Minimum	11.9a	5.1a	3.7b	2.22c
Do	Normal	12.0a	5.1a	4.1b	1.70d
After frost	Minimum	11.6a	5.8a	8.6a	4.53a
Do	Normal	10.4a	5.0a	8.4a	3.14b
West Texas:					
After frost	Minimum	9.2a	6.1a	39.1a	14.2b
Do	Normal	9.6a	6.1a	39.1a	9.8a

[1] Means in a column within a growth area followed by different letters are significantly different at the 5-pct level.
[2] See table 1.

TABLE 3.—*Effects of gin-cleaning conditions on waste removal, fiber properties, bale weights, and lint turnouts of test cottons*[1]

Growth area and time of harvest	Gin-cleaning condition[2]	Shirley analyzer waste (pct)	Classer's grade and code	Classer's staple length (32d inch)	Bale weight[3] (lb)	Lint turnout[4] (pct)
Midsouth:						
Before frost	Minimum	5.6b	LMLtSp, 52	34a	546	NA
Do	Normal	1.5a	SLMLtSp, 42	34a	500	NA
After frost	Minimum	7.1b	LMLtSp, 52	34a	545	NA
Do	Normal	1.9a	SLMLtSp, 42	34a	500	NA
Southeast:						
Before frost	Minimum	7.3b	LM, 51	35a	591	39.4a
Do	Normal	2.6c	SLM+, 40	35a	547	36.5b
After frost	Minimum	11.6a	BG, 81	35a	591	39.4a
Do	Normal	2.7c	SLM, 41	35a	525	35.0b
West Texas:						
After frost	Minimum	12.7b	BG, 81	31a	549	21.5b
Do	Normal	3.3a	LMSp, 58	31a	477	18.7a

[1] Means in a column within a growth area followed by different letters are significantly different at the 5-pct level.
[2] See table 1.
[3] Estimated bale weights for the Midsouth cotton.
[4] NA means percentage of lint turnout not available.

matter content at the wagon of the cotton harvested after frost was approximately twice that of the cotton harvested before frost. The foreign-matter content at the feeder apron of the cotton harvested after frost was also higher than that of the earlier harvest. The normal gin treatment produced lint with the lowest Shirley analyzer values (table 3). The cotton harvested after frost and subjected to the minimum gin treatment had the highest Shirley analyzer value. The cotton that received the minimum gin treatment also produced the highest lint turnout, mostly because of its higher trash content. The bale weights ranged from 525 pounds for the normal gin treatment to 591 pounds for the minimum gin treatment. The lint from the minimum gin treatment for the cotton harvested before frost was graded Low Middling, and the lint from the normal gin treatment was graded Strict Low Middling Plus. The lint from the minimum gin treatment for the cotton harvested after frost was graded Below Grade, and the lint from the normal gin treatment was graded Strict Low Middling. There were no significant differences in classer's staple length.

West Texas

Adverse weather conditions during the growing season resulted in one of the lowest quality cotton crops ever produced in the West Texas growth area. The test cotton contained higher than normal amounts of foreign matter (table 2), and it had a lower than normal micronaire value. The test cotton also contained large amounts of bark, which caused bales to be penalized in grade.

There were no significant differences in the moisture or initial foreign-matter contents of the cottons subjected to the two gin-cleaning treatments. Minimum gin cleaning resulted in higher foreign-matter content of seed cotton at the feeder and in higher ginned-lint turnout (table 3). Minimum gin cleaning produced a Shirley analyzer waste value that was almost four times higher than that produced by normal gin cleaning, which resulted in a substantially higher lint turnout and bale weight for the cotton receiving minimum gin cleaning. The difference in bale weight between minimum and normal cleaning was 72 pounds. The cotton that received minimum cleaning was graded Below Grade, while the normally cleaned cotton was graded Low Middling Spotted. There was no significant difference in classer's staple length.

Ginned-Lint Fiber Quality

Midsouth

The ginned lint from the after-frost harvest had a significantly shorter 2.5-percent span length, lower length uniformity, and lower micronaire reading than the lint from the harvest before frost for both gin-cleaning conditions (table 4). However, the cotton harvested after frost had a higher Pressley 1/8-inch-gage strength for both gin-cleaning conditions. The cotton from each harvest had a significantly shorter 2.5-percent span length and lower length uniformity when processed with normal gin-cleaning equipment than when processed with minimum gin-cleaning equipment.[5] There was no significant difference in Pressley 1/8-inch-gage strength between the two gin-cleaning conditions for the harvest before frost. However, the cotton processed with normal gin-cleaning equipment was significantly weaker for the harvest after frost. No significant difference existed in micronaire reading between the two gin-cleaning conditions for either of the two harvests.

Southeast

Ginned lint from the harvest after frost had a significantly shorter 2.5-percent span length, lower Pressley 1/8-inch-gage strength, and higher micronaire reading than the lint from the harvest before frost for both gin-cleaning conditions. Length uniformity was higher for the harvest before frost. The cotton processed by normal gin-cleaning equipment had a significantly shorter 2.5-percent span length than the cotton processed by minimum gin-cleaning equipment. There was also a trend for the normally cleaned cotton to have a lower length uniformity, lower Pressley 1/8-inch-gage strength, and lower

[5] Newton, F. E.; Calkin, E. W. S.; and Griffin, A. C. 1964. Fiber and spinning properties of cotton as affected by certain harvesting and ginning practices, Yazoo—Mississippi Delta, 1959–60. U.S. Dep. Agric. Mark. Res. Rep. 656, 27 pp. Ross, J. E., and Shanklin, E. H. 1964. Some effects of gin drying and cleaning of cotton on fiber length distribution and yarn quality. U.S. Dep. Agric. Mark. Res. Rep. 666, 12 pp.

e reading than the cotton processed
mum gin cleaning equipment.[6]

as

were no significant differences due to
ng conditions in 2.5-percent span
ngth uniformity, or Pressley 1/8-inch-
ngth. The minimum gin-cleaning con-
ulted in a lower micronaire reading.

nisher-Drawing Fiber Quality

n-min condition resulted in a longer
t span length than that of either of
two cleaning conditions for the cotton
after frost (table 5). There were no
t differences among cleaning condi-
he earlier harvest. Length uniformity
tton harvested before frost was sig-
higher for condition min-min than
ion norm-min. There were no signifi-
rences in length uniformity among

ardi, G. J., Jr. Micronaire fineness as af-
tton ginning. Cotton Gin and Oil Mill Press,
5, pp. 14–16.

the cleaning conditions for the later harvest. Condition min-add resulted in a higher Pressley 1/8-inch-gage strength than that of condition min-min for the cotton harvested before frost. No significant differences in fiber strength existed among the cleaning conditions for the later harvest. The micronaire reading was lower for condition min-add than for the other two cleaning conditions using the cotton harvested before frost. The later harvest resulted in a higher micronaire reading for condition min-min than for the other two cleaning conditions.

Southeast

A higher length uniformity resulted from condition min-min than from condition min-add for the cotton harvested before frost. Condition min-min also resulted in a higher Pressley 1/8-inch-gage strength than did condition norm-min for the later harvest. There were no other significant differences among the cleaning conditions for either harvest.

West Texas

A higher length uniformity was obtained for condition min-add than for condition min-min. There were no other significant differences among the cleaning conditions.

TABLE 4.—*Effects of gin-cleaning conditions on fiber properties of ginned lint*[1]

Growth area and time of harvest	Gin-cleaning condition[2]	2.5-pct span length (inches)	Length uniformity (pct)	Pressley strength, 1/8-inch gage (g/tex)	Micronaire reading
Midsouth:					
Before frost	Minimum	1.132a	45.0a	23.1b	4.81a
Do	Normal	1.123b	44.1b	23.0b	4.84a
After frost	Minimum	1.105c	44.0b	24.2a	3.51b
Do	Normal	1.090d	42.2c	23.4b	3.54b
Southeast:					
Before frost	Minimum	1.102a	45.4a	22.1a	4.23c
Do	Normal	1.085b	44.3b	21.5b	4.28c
After frost	Minimum	1.079b	44.5b	21.3bc	4.60a
Do	Normal	1.061c	44.0b	20.9c	4.48b
West Texas:					
After frost	Minimum	1.018a	42.1a	22.6a	2.67b
Do	Normal	1.012a	41.8a	22.6a	2.74a

[1] Means in a column within a growth area followed by different letters are significantly different at the 5-pct level.
[2] See table 1.

t- and Mill-Processing Performance

cotton subjected to the gin-cleaning ent that was considered normal for each ive area produced significantly less g and picking waste than did cotton sub- to the minimum gin treatment for each able 6). The amount of waste produced carding was a direct result of the effi- of the gin- and mill-cleaning treatment e cotton had received. If little waste was d during gin and mill cleaning, the t percentage of waste was removed at r. Cleaning condition norm-min produced antly less card waste than did the other nditions for all growth areas. Condition d consistently produced lower amounts l waste than did condition min-min for as, although these differences were not ant.

production rates for the Midsouth cotton imilar for both harvests. However, the harvest gave the highest production or the Southeast cotton. In comparing aning conditions, the highest production as achieved by condition min-min in the Midsouth and Southeast growth areas. Since this cleaning condition represented the minimum amount of mechanical beating at the gin and mill, it can be assumed that it caused less fiber damage than did the other two cleaning conditions. This was confirmed, at least for the Midsouth and Southeast cottons, by the fiber tests on the finisher-drawing sliver (table 5). The results show a longer 2.5-percent span length and higher length uniformity for the cotton from condition min-min than for the cotton from the other two cleaning conditions.

Yarn Quality

Midsouth

Cotton harvested after frost produced a significantly higher break factor than did cotton harvested before frost for cleaning condition norm-min (table 6). Yarn appearance indices for each of the three cleaning conditions were significantly higher for the harvest before frost than for the harvest after frost. The earlier harvest also produced a significantly lower number of neps and a lower irregularity coeffi-

TABLE 5.—*Effects of gin- and mill-cleaning conditions on fiber properties of finisher-drawing sliver*[1]

Harvesting and processing code[2]	2.5-pct span length (inches)	Length uniformity (pct)	Pressley strength, ⅛-inch gage (g/tex)	Micronaire reading
Midsouth:				
Bef-min-min	1.150a	47.5a	21.1b	4.95a
Bef-norm-min	1.125ab	45.5b	22.4ab	4.95a
Bef-min-add	1.134ab	47.2ab	22.7a	4.80b
Aft-min-min	1.113b	46.8ab	23.2a	3.65c
Aft-norm-min	1.084c	46.0ab	22.3ab	3.55d
Aft-min-add	1.082c	46.7ab	22.3ab	3.50d
Southeast:				
Bef-min-min	1.079a	47.0a	20.9a	4.20b
Bef-norm-min	1.074a	46.0ab	20.8abc	4.20b
Bef-min-add	1.077a	45.0b	20.9a	4.20b
Aft-min-min	1.090a	47.8a	20.8ab	4.40a
Aft-norm-min	1.081a	47.3a	19.4c	4.45a
Aft-min-add	1.070a	47.5a	19.6bc	4.45a
West Texas:				
Aft-min-min	1.025a	44.2b	19.3a	2.80a
Aft-norm-min	1.019a	45.8ab	19.3a	2.80a
Aft-min-add	1.038a	46.5a	19.8a	2.80a

[1] Means in a column within a growth area followed by different letters are significantly different at the 5-pct level.

[2] See table 1.

TABLE 6.—*Gin- and mill-cleaning performance and effects of cleaning conditions on yarn properties*[1]

Harvesting and processing code[2]	Opening and picking waste (pct)	Card waste (pct)	Front-roll speed (r/min)	Break factor	Yarn appearance index	Single-strand strength (g/tex)	Single-strand elongation (pct)	Single-strand strength CV (pct)	Yarn neps (No./1,000 yd)	Irregularity CV (pct)
Midsouth:										
Bef-min-min	2.31bc	5.80a	175a	1,913a	84.5a	13.0b	5.0a	11.1ab	943b	22.2b
Bef-norm-min	.29c	3.36c	164b	1,768b	83.5a	12.9b	5.2a	11.1ab	914b	22.4b
Bef-min-add	4.11ab	4.88ab	172a	1,882a	85.0a	13.3ab	5.6a	9.6ab	875b	22.3b
Aft-min-min	2.54bc	6.13a	177a	1,908a	77.5b	13.7ab	5.4a	9.4ab	911b	22.2b
Aft-norm-min	.53c	3.82bc	174a	1,925a	69.0c	13.5ab	5.3a	11.8a	1,066a	23.3a
Aft-min-add	4.91a	5.40a	176a	1,941a	69.5c	14.0a	5.4a	9.0b	930b	22.0b
Southeast:										
Bef-min-min	2.64b	6.10b	173a	1,674bc	79.5a	12.5a	5.4ab	10.1b	748d	22.9ab
Bef-norm-min	.41b	3.53c	159b	1,736a	75.0a	12.2ab	5.3ab	10.7b	881c	22.7b
Bef-min-add	4.84a	5.16b	167a	1,718ab	68.0b	12.9a	6.0a	10.0b	967bc	23.3a
Aft-min-min	5.46a	7.79a	151c	1,601d	68.0b	11.6bc	5.6ab	12.0b	962bc	23.4a
Aft-norm-min	.51b	3.55c	141d	1,641cd	68.0b	11.2c	5.2b	14.5a	1,090a	23.4a
Aft-min-add	6.89a	5.90b	145cd	1,644cd	66.0b	11.2c	5.2b	10.3b	1,007ab	23.4a
West Texas:										
Aft-min-min	4.57a	11.04a	181a	1,958a	87.5a	13.5a	6.1a	10.8a	1,235c	22.7c
Aft-norm-min	.65b	5.63c	170b	1,722b	89.0a	13.1a	5.8a	10.1a	1,702a	25.9a
Aft-min-add	6.71a	8.69b	182a	1,927a	84.5a	13.6a	6.2a	9.7a	1,441b	24.2b

[1] Means in a column within a growth area followed by different letters are significantly different at the 5-pct level.
[2] See table 1.

ent of variation (CV) than did the later harest for cleaning condition norm-min. No other gnificant differences existed for the remainig yarn quality variables.

Break factor for the harvest before frost was gnificantly lower for condition norm-min than or the other two cleaning conditions. Yarn apearance index for the later harvest was sigficantly higher for condition min-min than or the other cleaning conditions. Single-strand rength CV was significantly lower for condion min-add than for condition norm-min. Contion norm-min also produced a significantly gher number of neps and a higher irregurity CV than did the other two cleaning nditions.

uthcast

Break factor and single-strand strength were gnificantly higher for the cotton harvested fore frost than for the cotton harvested after ost. Strength CV was lower for the earlier rvest than for the later harvest for cleaning ndition norm-min. The earlier harvest proced a higher single-strand elongation than d the later harvest for cleaning condition mind. Yarn appearance was better and the numr of yarn neps was lower for the earlier rvest than for the later harvest for cleaning nditions min-min and norm-min. Irregularity V was lower for the earlier harvest than for e later harvest for cleaning condition rm-min.

Tho break factor for the harvest before frost condition norm-min was significantly higher an that for condition min-min. The yarn aarance indices for conditions min-min and rm-min were better than the index for condin min-add. The number of yarn neps was ver for condition min-min than for the other aning conditions. Irregularity CV was lower condition norm-min than for condition n-add.

The strength CV values for the later harvest conditions min-min and min-add were sigicantly lower than the value for condition rm-min. Condition min-min produced fewer n neps than did condition norm-min. No er significant differences existed for the naining yarn quality variables.

West Texas

The break factors for conditions min-min and min-add were significantly higher than the factor for condition norm-min. The number of yarn neps and the irregularity CV values were different for all three cleaning conditions. The min-min condition resulted in the best overall yarn quality, followed by conditions min-add and norm-min.

CONCLUSIONS

Cleaning conditions min-min and min-add produced yarns of similar overall quality, while the quality of the yarn from condition norm-min was noticeably lower. In general, the yarn from condition min-min was slightly better in quality than the yarn from condition min-add. The implication of this conclusion is that a higher level of yarn quality was achieved with the cotton that received less than normal cleaning at the gin. Furthermore, the highest yarn quality was achieved without the use of additional cleaning equipment in the mill opening line for removing trash left in cotton at the gin. The results indicate that the carding process was capable of handling the increased trash that would normally have been removed either by the gin or opening line. The fiber-quality data on finisher-drawing sliver for the Midsouth and Southeast cottons indicate that removal of trash at the card, rather than in an earlier stage of processing, resulted in less fiber damage.

No overall conclusion was possible concerning the effect of time of harvest on yarn quality. There was no consistent trend for the Midsouth cotton; some yarn-quality characteristics were better for the harvest before frost, and some were better for the harvest after frost. For the Southeast cotton, however, yarn quality was consistently better for the earlier cotton harvest. This difference between the two areas could be due to uncontrollable factors, such as the severity of the frost in each area and the length of time between the two harvests. This was only 2 weeks in the Midsouth area as compared with 7 weeks in the Southeast area.

Spinning production rates reflected the level of yarn quality. There was little difference in

oduction rates between the before- and after-ost harvests for the Midsouth cotton. The oduction rates for the Southeast cotton from e earlier harvest were higher than those from the later harvest. Among the three cleaning conditions, the highest production rate for the Midsouth and Southeast cottons was achieved with cleaning condition min-min.

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